

# *epi*TRENDS

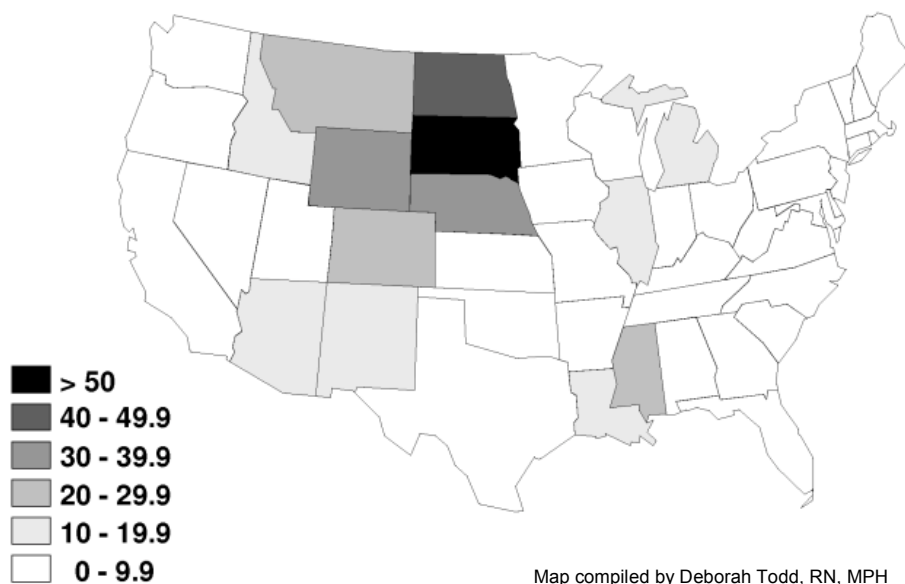
A Monthly Bulletin on Communicable Disease Epidemiology and  
Public Health Practice in Washington State

## Surveillance During a West Nile Virus Outbreak

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From its first identification in 1999 in New York City through 2008, 11,807 cases of West Nile neuroinvasive disease (WNND), including encephalitis, meningitis, and acute flaccid paralysis, were reported from 47 states and the District of Columbia; of these, nearly 10% were fatal. In addition, roughly 16,500 cases of West Nile fever (WNF) and nearly 700 other illnesses attributed to West Nile virus (WNV) were reported. Despite the spread into the Pacific and Northwest states, Washington has remained relatively unaffected (Figure). Only six locally acquired human cases of WNV infection have been reported in Washington; of these only two were WNND.

**Figure. Mean WNND incidence per 1,000,000 per year from the year WNV first caused human illness in the state through 2008.**



From 1999 through 2004, WNV rapidly spread across the United States resulting in explosive outbreaks of WNND in the central plains and Rocky Mountain states where *Culex tarsalis*, a highly efficient transmitter of WNV, is abundant (Figure). Although it is clear that *Cx tarsalis* significantly contributes to transmission, there appear to be other



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factors that influence why human disease incidence is highly variable from year to year or between areas with similar mosquito populations. For example, although eastern Washington has similar mosquito vectors, ecology, geography, climate, and irrigation practices as states like Colorado, Montana, and Idaho, there have only been two reported cases of WNV illness among residents from eastern Washington since 2006.



***Culex tarsalis***

Characteristic light banding  
on proboscis and legs

Photo credit: James Gathany, CDC

Extrapolating from the mean WNND incidence for seven recently affected western states and assuming homogenous distribution across Washington, hundreds of WNND cases would be expected (Table). Because of our similar ecology and vectors, the potential for a large-scale epidemic is real; therefore, it is essential to plan for epidemiologic surveillance, laboratory testing, and coordination with environmental health and communications.

**Table. Mean WNND incidence per 1,000,000 per year from the year WNV caused first human illness through 2008 for selected states.**

State	Year of first human illness	Total number of WNND cases	Rate per 10 <sup>6</sup> per year	Potential equivalent number of WNND cases in WA
South Dakota	2002	1716	56.0	367
North Dakota	2002	1283	40.9	268
Wyoming	2003	653	38.3	251
Nebraska	2002	2809	33.7	221
Colorado	2002	4350	26.5	174
Montana	2002	496	20.7	136
Idaho	2004	1184	15.1	99

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## **WNV Surveillance**

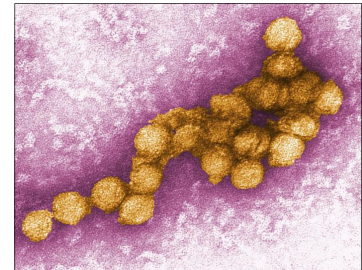
The primary reasons for conducting WNV surveillance are to describe cases, identify areas for vector control, and detect new risks for transmission. For human cases we review both clinical illness, either neuroinvasive disease or fever, and the patient history, including recall of mosquito bites, travel to area with WNV activity during likely incubation, other risk factors for transmission (e.g., transfusion), and laboratory evidence. Knowing the exposure location, such as a park, campground, or residential area, may enable us to provide useful information for mosquito control and environmental health activities. To assist in these preventive efforts, the WNV case report form is being modified to solicit additional specific exposure information.

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Ill horses, dead birds, and mosquito pools have been monitored in Washington since 2001. When positives are detected, the information is mapped to identify any clusters or unusual exposures. Knowing these areas where WNV is actively circulating helps with prevention and control strategies — it shows where people might be at higher risk of exposure and infection.

## Testing for Human Cases

There are numerous tests for WNV. Currently, Washington State Public Health Laboratories (PHL) run two tests: (1) the enzyme immunoassay (EIA) for IgM antibody in serum or cerebrospinal fluid (CSF); and (2) the microsphere immunoassay (MIA) for IgM in serum or CSF. When results are indeterminate at PHL, specimens can be forwarded to Centers for Disease Control and Prevention (CDC) for additional testing including the plaque reduction neutralization assay (PRNT), which tests for presence of antibodies by whether infection of cells in lab can be blocked (“neutralized”). Other tests CDC can perform include EIA and MIA for IgG, immunofluorescence to look for IgM or IgG, and polymerase chain reaction (PCR) to test for genetic sequences of the virus itself. These additional tests sometimes provide information about the timing of infection.



**West Nile Virus**  
Photo courtesy of CDC  
Content: P.E. Rolin  
Photo: Cynthia Goldsmith

Criteria for persons to be tested at the PHL are as follows:

1. Patients with suspected WN neuroinvasive disease (fever and neurological signs) when there is no other likely diagnosis;
2. Symptomatic pregnant or breastfeeding women and their infants;
3. Recent blood, tissue, or organ donors or recipients suspected to have WNV infection; and
4. Persons with febrile disease and a positive WNV serology test from a commercial laboratory to confirm the diagnosis.

Initial testing for persons who do not fit in these four categories (i.e., person with febrile, non-neuroinvasive disease) should be performed at a commercial laboratory. Under these existing criteria, PHL will continue to test and confirm all human cases as we move into summer 2009.

In the event of a large-scale outbreak situation in which human WNV disease is established in the state or county, PHL will discontinue confirmatory testing of specimens with positive results from commercial laboratories (currently category 4 above). Instead, we will shift to using commercial lab results as confirmatory. PHL will continue to test the other three categories and any special cases requested by the local health jurisdiction.

## Case Reporting

To date, we have identified a total of six endemically acquired cases (in four counties) and 19 travel-associated cases of WNV among Washington residents. Blood banks in the United States now screen all donations for the presence of WNV. This policy was implemented soon after the 2002 recognition that transmission by blood transfusion was possible. One presumptive viremic blood donor was identified in Washington in 2008.

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Confirmed cases are reported electronically to Communicable Disease Epidemiology (CDES) via PHIMS and subsequently reported to CDC to be included in the national case counts. Reporting excludes suspect cases or cases still being investigated. Cases infected in other states and asymptomatic persons with positive tests are not counted as “Washington cases.”

New communicable disease challenges arise constantly for public health agencies. The recent response to novel influenza outbreak was handled superbly by local health jurisdictions in Washington. With planning and preparation, an outbreak of WNV would be equally well managed.

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## Resources

For more information about West Nile Virus, see:

Washington State Department of Health:

- Notifiable Conditions: <http://www.doh.wa.gov/notify/nc/wnv.htm>
- Environmental Health: <http://www.doh.wa.gov/ehp/ts/Zoo/WNV/WNV.html>

Centers for Disease Control: <http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>

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“Larvaciding” mosquito breeding pools

Photo courtesy of CDC